REMARKS

Claims 1-63 are all the claims pending in the application.

Claims 31-46 and 62-63 have been rejected under 35 U.S.C. § 112, first paragraph.

Claims 1-30, 32-33, 40-41 and 47-61 have been rejected under 35 U.S.C. § 112, second paragraph.

Claims 31-46 and 62-63 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Liao (US 6,185,208).

Claims 1-30 and 47-61 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of Lakshman ("High-speed policy-based packet forwarding using efficient multi-dimensional range matching", ACM SIGCOMM Computer Communication Review, vol. 28, No. 4, 1998, pp. 203-214).

Claims 2, 7-15, 17, 22-30, 48, 53-61 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of Lakshman as applied to claims 1, 16 and 47 and further in view of Spinney (5,414,704).

Claims 3, 18 and 49 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over applicants' admitted prior art in view of Lakshman as applied to claims 1, 16 and 47 and further in view of Chaudri (6,275,861).

Claims 4-5, 19-20 and 50-51 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over applicants' admitted prior art in view of Lakshman as applied to claims 1, 16 and 47 and further in view of Kerr (6,590,894).

Claims 6, 21 and 52 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over applicants' admitted prior art in view of Lakshman as applied to claims 1, 16 and 47 and further in view of Thomas (A User Guide to the Unix System, Rebecca Thomas, et al, 1985).

Claims 7, 22, 53 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of Lakshman as applied to claims 2, 17 and 48 and further in view Chaudri (6,275,861).

Claims 8-9, 23-24 and 54-55 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of Lakshman and further in view of Spinney, as applied to claims 1, 16 and 47, and further in view of Kerr (6,590,894).

Claims 10, 25 and 56 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of Lakshman, and further in view of Spinney, as applied to claims 2, 17 and 48, and further in view of Thomas.

Claims 11, 26 and 57 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of Lakshman, and further in view of Spinney, as applied to claims 2, 17 and 48, and further in view of Sternberger (4,788,656).

Claims 36-38 and 44-46 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Liao (6,185,208) in view of Applicant's admitted prior art.

Claims 34, 36-38, 42, 44-46 and 62-63 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Liao (6,185,208).

The Applicants traverse the rejections and request reconsideration.

Formal Matters

The Applicants request the Examiner to return a signed and initialed copy of the PTO Form 1449, to indicate consideration of the IDS filed on January 14, 2002.

Rejections Under 35 USC § 112

Examiner rejects claims 31-46 and 62-63 asserting that that "the specification does not reasonably provide enablement for the generation of a 'white' hash address". The Examiner points out that "it is unclear by what measure the tuples are considered to be close in proximity". To that effect the Examiner suggests two possibilities: a) the numerical equivalent of the tuple; and, b) a subset of the corresponding fields differing by a small value, though the overall numerical value might differ by a large value.

The Applicants respectfully submit that a person having ordinary skills in the art would not have chosen option b) as it would lead to the conclusion that separate hash operation would have to be executed on each of such subset field. In contrast, throughout the present disclosure the Applicants refer to the entire 104 bits of the tuple as a single large address space.

It may be true that the uniformity of a hashing function may depend strongly on the range of inputs. However, that is all the more reason for the purported advantage of the present invention. Because, while the tuples may be highly localized the hashed numbers will be spread throughout the much more limited range of the hashed numbers.

The Examiner asserts that there is a lack of a polynomial for the CRC block of Fig. 3. Applicants note, however, in the description that "while any hash function could be used it is necessary to ensure that the specific hash function used generates a 'white hash address'".

Examiner contends that "one skilled in the art could not make and use the 'white hashing' function... without undue experimentation". Applicants respectfully submit that a person skilled in the art would apply simulations to the specific system and select the most appropriate hash function that delivers the "white hashing" disclosed in the invention. Such simulations are routinely performed and are required for the mere purpose of determining which polynomial is to be used in a given implementation. These simulations are not believed to be "undue" experimentation.

Examiner rejects claims 1-30, 32-33, 40-41 and 47-61 as indefinite. Specifically, the Examiner objects to the use of the terms "significantly smaller" and the term "significantly larger" as being "relative terms which renders the claims indefinite". The Applicants respectfully submit that the use of relative terms *per se* should not render the claims indefinite. The Examiner's attention is drawn to MPEP 2173.05(b), where the term "substantially" (similar in meaning to the term "significantly") is found to be definite.

Applicants respectfully point out that no less than 410 issued U.S. patents, starting with patent 3,935,591 to 6,628,730, and including 6,623,579, 6,615,237, and 6,046,988, all use the term "significantly larger" in the claims and were allowed by the USPTO, though no apparent qualifiers can be found in the detailed description. Furthermore, no less than 423 issued U.S. patents include the term "significantly smaller" in their claims. Among many others U.S. Patents 6,541,836 and 6,434,203 can be pointed out

Notwithstanding the Examiner's contention, it is clear that the USPTO as a matter of fact, does accept that the terms "significantly larger" and "significantly smaller." It is believed that a skilled artisan would know what these ranges indicate, without undue experimentation.

Rejections Under 35 USC § 102

Examiner rejects claims 31-46 and 62-63 as being anticipated by Lia (U.S. Patent 6,185,208) (hereinafter "Liao"). While Liao discloses a hash function, it is merely a general hash function for the mere purpose of mapping a large address space into a smaller address space. Examiner is incorrect in contending that Liao discloses the handling of a tuple by merely combining an IP address and a port number. A tuple is known to those skilled in the art relating to this invention, to be a combination of a source IP (for example, 32 bits), source port (for example, 16 bits), destination IP (for example, 32 bits), destination port (for example, 32 bits), and a protocol identifier (for example, 8 bits), totaling 104 bits. In other words, the tuple of the present invention is completely different from what the Examiner characterizes in Liao to be a tuple. In fact, the alleged tuple in Liao is merely a combination of the IP address and a port number.

Further, Liao does not disclose splitting the tuple into two images of length X and Y bits. Still further, Liao does not disclose generating a white hash address of Z bits from X bits. Still further, Liao does not disclose combining the white hash address of Z bits with Y bits to using a Boolean operator to generate an M-bit has address.

In this regard, the Examiner is believed to be mischaracterizing the teaching of Liao to conform to the claimed invention. In fact, to create a hash address, Liao merely performs an exclusive OR operation on all the four bytes of the IP address and the two bytes of the port number. The Applicant respectfully submits that any other way of performing the operations noted in Liao will render Liao's computations meaningless and inoperable.

It is believed that, applying the teachings of Liao for the purposes of the disclosed invention would at least result in the hash addresses being closely concentrated when the tuples are in high proximity.

The Applicants respectfully submit that Lia does not anticipate (or remotely suggest) claim 31, at least because, it does not disclose the specific hash operation recited therein.

Claim 39 is a computer program product claim that includes limitations similar to the ones in claim 31. Therefore, the arguments discussed above are analogously valid.

Claims 32-28 and 40-47 are allowable at least based on their dependency on claims 31 and 39.

Rejections Under 35 USC § 103

Examiner rejects claims 1-30 and 47-61 as being unpatentable in view of the admitted prior art and Lakshman. The Examiner fails to note a significant qualifier made by Lakshman namely that: "...any hash function that is used must... randomly distribute 100 to 200 bit keys of the header to no more than 20-24 bits of hash index. Since there is no knowledge about the distribution of the header values... the design [of] a good hash function is not trivial" (Lakshman page 205, column 1, lines 17-22).

Applicants respectfully submit that Lakshman describes the design of such a hash function as being a significant challenge, specifically with respect to gigabit and faster network applications. This is particularly so, when performance is required at wire-speed. Specifically, Lakshman notes that efficient classification algorithms "must be fast enough for use in routers with Gigabit links..." and further notes that "the algorithm must be able to process every packet arriving to the physical interface at wire-speed" (page 205, column 2, section 2.2 #1 and #2).

Contrary to the Examiner's assertion, Lakshman does not teach a hash function capable of handling the reduction of N bits to a M bit hash address, where M is significantly smaller than N.

In contrast, the present invention provides a hash function, for example, that reduces the 104 bit tuple to a 20 bit hash address, thus overcoming the significant problem noted by Lakshman as being challenging. The Applicants respectfully submit that a skilled artisan would not have been able to make the apparatus of claim 1 from the suggestions of Lakshman and the admitted prior art.

Independent claims 16 and 47 include limitations analogous to the ones described above in relation to claim 1. Therefore, the arguments noted above are analogously valid.

Rejection of dependant claims

The Applicants thank the Examiner for the detailed analysis and comparison of dependant claims with several cited references. The Applicant have considered the specific arguments. However, only arguments that are relevant to the Applicants counter-arguments are discussed herein.

Claims 2-14, 17-30 and 48-61 are dependant on claims 1, 16 and 47. Therefore, they should be patentable at least by virtue of their dependency.

Further, the Examiner rejects claims 2, 7-15, 17, 22-30, 48 and 53-61 as being not patentable over the APA in view of Spinney (U.S. Patent 5,414,704). Spinney, not only fails to overcome the above-noted deficiency, it in fact teaches away from the present invention. In making the rejection, Examiner cites Figure 8 of Spinney. However, it is easy to note that the

hash function described therein converts the 48 bits input address (85) into a 48 bits hash address (89). Therefore, it teaches away from having a hash address that is significantly smaller than the input tuple. Because of the same reason, Spinney cannot be combined with the system used by Lakshman and the admitted prior art without significant modifications. It is believed that such modifications would render Lakshman and/or Spinney inoperable for their intended purposes.

Still further, Examiner rejects claims 3, 18 and 49 as being unpatentable over the APA in view of Lakshman and further in view of Chaudri (U.S. Patent 6,275,861). While Chaudri shows one way of using a flow identification, it is specifically targeted to perform in a recursive manner (see for example claim 1) which puts significant performance requirements if there is a desire to operate in wire-speed at a data rate of one gigabit and above. Such a recursive flow identification is not believed to be compatible with Lakshman. Therefore, the techniques used by Chaudri is not believed to be combinable with Lakshman without significant modifications.

Examiner rejects claims 4-5, 19-20 and 50-51 as being unpatentable over the APA in view of Lakshman and further in view of Kerr (U.S. Patent 6,590,894). Kerr is not believed to overcome the deficiency noted above in the teachings of Lakshman.

Examiner rejects claims 6, 21 and 52 as being unpatentable over the APA in view of Lakshman and further in view of Thomas' "A User Guide to the Unix System" (hereinafter "Thomas"). Thomas is not believed to overcome the deficiency noted above in the teachings of Lakshman.

Examiner rejects claims 7, 22 and 53 as being not patentable over the APA in view of Lakshman and further in view of Spinney and Chaudri. As noted above, the combined teaching

of Lakshman/Spinney/Chaudri is not believed to overcome the deficiency discussed in relation to claim 1.

Examiner rejects claims 8-9, 23-24 and 54-55 as being not patentable over the APA in view of Lakshman and further in view of Spinney and Kerr. Likewise, the combined teachings of Lakshman/Spinney/Kerr are not believed to overcome the deficiency discussed in relation to claim 1.

Examiner rejects claims 11, 26 and 57 as being not patentable over the APA in view of Lakshman and further in view of Spinney and Sternberger (U.S. Patent 4,788,656. Sternberger is not believed to overcome the deficiency noted above in the combined teachings of Lakshman/Spinney.

Examiner rejects claims 10, 25 and 56 as being not patentable over the APA in view of Lakshman and further in view of Spinney and further in view of Thomas' "A User Guide to the Unix System". As noted above the combined teachings of Lakshman/Spinney/Thomas are not believed to overcome the deficiency discussed in relation to claim 1.

Rejection of claims 34, 36-38, 42, 44-46 and 62-63 under 103(a) based on Liao

Examiner rejects claims 34, 36-38, 42, 44-46 and 62-63 as being not patentable over Liao's U.S. Patent 6,185,208 (hereinafter "Liao"). In relation to the rejection claims 31-46 and 62-63, deficiencies were noted in the teachings of Liao. The claims noted above depend on claims 31 and 46 and are believed to be allowable at least by virtue of their dependency.

Further, Applicants disagree with the Examiner's assertion that the use of "OR" or "AND" Boolean operators "are merely a matter of design choice and would have been obvious

in the system of Liao". Liao does not suggest dealing with large address spaces resulting from a tuple (for example, with 104 bits).

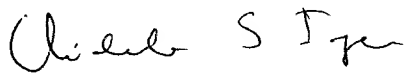
The disclosed invention allows for the distribution of tuples being in close proximity over the full range of the hashed address, which is not taught by Liao. The hashed address generation technique of the disclosed invention is completely different and provides a significant advantage over the hash function suggested by Liao. Using the techniques of the present invention the hashed addresses are distributed over the entire range of the possible hashed addresses.

CONCLUSION

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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